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THE VETERINARY RECORD

The Journal of the British Veterinary Association

Patron: Her Majesty the Queen

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Report of the Committee of Enquiry into the Export of Live Cattle to the Continent for Slaughter

IT will be recalled that in view of public uneasiness about the conditions under which live cattle were being shipped to the Continent for slaughter, a Committee was appointed on February 6th this year by the Minister of Agriculture and the Secretary of State for Scotland. It had the following terms of reference:—

> "To enquire into the export trade in live cattle from Great Britain to the Continent for slaughter, the considerations affecting the continuance of this trade, and steps to avoid unnecessary suffering of the cattle at all stages of their journey; to consider whether slaughter before export would be a desirable and feasible alternative; and to make recommendations."

The Committee's Report was laid before the House of Commons on Tuesday afternoon last, and the first impression received on reading it is to wonder at the great volume of work which was accomplished, including a number of visits to the Continent, in so short a time. The visits are described in a series of interesting appendices. Readers will have in mind that a distinguished veterinarian was among the Committee's members, who were: Lord Balfour of Burleigh, Lady Tweedsmuir, Mr. A. J. Champion, Mr. G. N. Gould, and Mr. Clyde Higgs. Mr. T. P. Marten of the Ministry of Agriculture was secretary.

In an early paragraph of their report, which is of itself ample vindication of the Committee's appointment, it is stated:—

> We find that the great public anxiety about this export trade derives in the main from apprehension on four points:—
>
> (i) export of animals unfit to stand the journey abroad;
>
> (ii) lack of adequate care and attention before embarkation;
>
> (iii) long train journeys without food or water after disembarkation on the Continent;
>
> (iv) deprivation of the protection of the British slaughter of animals legislation.
>
> We desire to say at once that there is justification for anxiety on all these grounds. We feel bound to say also that we do not think that all those engaged in this trade have shown themselves to be fully alive to the degree of suffering capable of being caused to animals during transport by land or sea.

Further paragraphs, of particular interest to the profession in view of our reiterated plea that veterinary surgeons ought to play an appropriate part in meat inspection, read:—

> It has been suggested to us that the lack of veterinary supervision of meat inspection in England and Wales may add to the difficulties of exporting meat to the Continent since most Continental countries require certificates of veterinary inspection *ante-* and *post-mortem*. We have noted that at Southampton and some other places arrangements have been made for the provision of veterinary certificates in respect of meat slaughtered for export to France, and we see no reason why similar arrangements should not be made at other slaughter-houses.
>
> We were shocked to learn that contracts for the supply of meat for the United States Forces in Europe could not be arranged from this country direct because our slaughter-houses fall short of the standards demanded by the American Army Veterinary Corps. The first shipment abroad of live cattle was in fact made in order to complete an American Army contract, the slaughter-houses in The Hague and Rotterdam having been approved by the American authorities.

Another interesting point concerns the design of railway wagons used for transporting live animals. Of this the Committee write:—

> The Continental railway wagons used for the carriage of livestock seem to be much better than those used in this country. The vehicles are much bigger, and being wider also, provide more room for the animals. While the rail gauge on the Continent is the same as in Great Britain, the wagons have a greater overhang. It may be that the design of platforms and bridges in this country would make it impossible to increase the width of wagons used for the carriage of livestock but we suggest that British Railways should investigate the possibility of improving the design of these vehicles. We would also emphasise the undesirability of carrying cattle in loose-coupled wagons; to the maximum possible extent they should be carried in trains fitted with continuous brakes.

In summing up, a plea is made that the entire subject of the transport of animals should be viewed with reasonable objectivity:—

> We are conscious of the general concern of people in this country with the welfare of animals. We feel, however, that some people may tend to be rather unrealistic in their approach to the question and we must emphasise that the fact has to be faced that the transport of animals is unavoidable and that generally it cannot be

undertaken on a large scale even within this country without some degree of suffering by the animals however well the regulations governing transport are applied. It is the responsibility of the farming and cattle-dealing community to see to it that they carry out their legitimate business with the greatest possible consideration for the animals concerned.

The Report ends with a Summary of Conclusions and Recommendations. It has to be seen how far Parliament will endorse the latter, and the Ministers concerned will make a statement in due course. The Summary reads as follows:—

(1) Except to a very limited extent the alternative of a carcase trade is not feasible;

(2) the journey by sea or air to the Continent is not a sufficient reason for imposing a total prohibition on the trade;

(3) the export of cattle for slaughter on the Continent should be allowed only to small countries or territories where internal transit after disembarkation can only be over short distances and where the Government concerned can give satisfactory assurances that the animals will not be allowed to be re-exported; the method of slaughter must satisfy British requirements and the conditions of lairage and slaughter-house facilities must be satisfactory;

(4) there is likely to be a continuing if spasmodic demand for British cattle for slaughter on the Continent;

(5) all cattle should be subjected, at the expense of the shipper, to compulsory veterinary inspection by veterinary officers of the Ministry of Agriculture, Fisheries and Food during their detention at the port under the Exported Cattle Protection Order, 1957—the standard set should be high enough to ensure that no animal unfit to travel is allowed to be shipped;

(6) the veterinary officer should be required to issue a licence covering the export of animals found fit for shipment; those found unfit should, at the veterinary officer's discretion, be licensed to the nearest available slaughter-house for immediate slaughter;

(7) consideration should be given to the possibility of introducing a "filter price" to prevent the shipment of any animal of less than a prescribed market value;

(8) cows heavily in milk should not be passed for export;

(9) premises for the detention of cattle intended for export should not be approved unless they are actually within the dock or airport area or adjacent to it; the premises should be permanent and covered;

(10) approved lairages should be divided so that not more than about 40 animals are rested together in each division—where the animals are not secured individually there should be continual supervision by an experienced stockman;

(11) in approved lairages, minimum requirements should be prescribed as to the amount of water trough space;

(12) in approved lairages, minimum requirements for hay rack space should be laid down;

(13) in approved lairages, detention pens should be provided for the segregation of animals where necessary;

(14) in approved lairages, not less than 20 lb. of hay should be provided for each animal during the prescribed 10-hour lairage period—a further 10 lb. should be provided for each period of 12 hours in excess of the first 10;

(15) the possibility of imposing statutory requirements as to tonnage and suitability of vessels used for carrying cattle from Great Britain should be considered;

(16) vessels carrying cattle to the Continent should not be allowed to sail if winds of force 6 or over are forecast;

(17) the decision whether to tie animals on board ship should be left to the Master's discretion;

(18) the regulations governing the transport of animals should be strictly enforced;

(19) British Railways should charge a head rate rather than a truck rate for the carriage of cattle;

(20) the Railway regulations for the feeding of livestock should be given statutory force;

(21) every effort should be made to encourage the disbudding of calves;

(22) British Railways should investigate the possibility of improving the design of railway wagons used for the carriage of livestock;

(23) local railway officials should be given greater discretion to permit animals in transit to be lairaged on railway premises in the event of delay or other emergency;

(24) the use of the electric goad should be encouraged;

(25) the transport of animals by air is commended.

It is hoped to make some editorial comment on the Committee's findings next week.

OVERSEAS STUDENTS WISH TO SEE PRACTICE

At the time of the International Veterinary Students' Congress, which takes place from July 10th to 21st this year, there will be a number of foreign students who would like to see practice in this country. Principals who would be good enough to make facilities available are asked to write to the honorary secretary of the Congress, Mr. G. H. K. Lawson, at the Royal (Dick) School of Veterinary Studies, Summerhall, Edinburgh, 9. It is understood that the students chosen will have a working knowledge of English, and members of the profession over here will be in the position of affording a valuable facility if they are able to invite a student to see practice with them.

"Fluorine Alleviators." II.—Trials Involving Rats

BY

G. F. BODDIE

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Introduction

THE term "fluorine alleviator" has been defined as a substance that can be given to animals in their food with the object of reducing the absorption of fluorine compounds ingested with contaminated herbage (Boddie, 1955). The problem of fluorosis was described in detail in the paper in which this definition of "fluorine alleviators" was given.

It is sufficient for the purpose of this description of trials involving rats to refer but briefly to the more salient points of the problem. There are areas where fluorosis occurs naturally and there are also districts where industrial fluorosis occurs in which it is either impossible or impracticable to remove the sources of fluorine compounds. In some industrial undertakings attempts to reduce the emission of fluorine compounds have only been successful to a minor degree. In these areas it would be useful to have available a substance which when fed to stock would alleviate the effects of continued ingestion of fluorine compounds. It has never been anticipated that such a substance would completely neutralise the effect of fluorine compounds, but the hope was that some substance could be found that would so reduce the absorption of fluorine compounds that the tissue changes produced would be minimised. If a fluorine alleviator was successful in mitigating the effect on teeth of growing stock and was capable of virtually eliminating lameness, it would be a great assistance in the areas mentioned.

Marcovitch & Stanley (1942) stated that the most commonly accepted antidote for fluorides is calcium in some form. In the earlier part of the trials to be described in this paper, calcium compounds alone were used. Sharpless (1936), Majumdar & Ray (1946), and Venkataramanan & Krishnaswamy (1944) all referred to the possibility of using aluminium compounds as fluorine alleviators either alone or in combination with calcium compounds. In the later part of the present trials aluminium compounds in combination with calcium compounds were employed and their effects compared with those of calcium compounds alone.

The information gleaned from the review of the literature on fluorine alleviators (Boddie, 1955) is largely applicable to the short-term effect of feeding fluorine antidotes and the information thus furnished suggests that bone and joint fluorosis might be mitigated or even prevented by the use of a suitable antidote during the normal summer grazing season in this country. The literature quoted in the review mentioned does not give much of a guide as to the possible value of fluorine antidotes to prevent bone and joint fluorosis in animals grazing contaminated pastures for long periods, such as a year or more, and it does not clearly establish the value of antidotes in the prevention of dental fluorosis in young stock grazing continuously on contaminated pastures from birth—such as, for instance, suckled calves and lambs.

It is naturally desirable that experiments should be carried out with cattle and sheep. To provide the information required, a substantial group of animals would be needed and the period of observation would require to extend to at least two years if the effects on dental fluorosis were to be assessed with any accuracy. Adequate control groups would be essential and their inclusion in the experimental trials would add to the expense involved. It was therefore felt desirable before launching on the larger—and much more costly—trials involving farm stock to study the long-term effects of feeding fluorine alleviators to small experimental animals. The animals chosen for the purpose of these trials were rats. It was realised that results obtained in rats are not necessarily translatable to ruminants, but it was considered that if results with rats indicated on a long-term basis the absorption of fluorine compounds could be reduced, the expense of major trials on ruminants would be justified.

Plan of Trials

The basic principle of the trials was that the absorption and retention of fluorine compounds would be assessed by estimating the fluorine content of the bulked skeleton of each individual rat. At the end of the experimental period the carcase of each rat was allowed to undergo a process of spontaneous maceration in a glass jar. As the soft tissue disintegrated this was removed by gentle washing with tap-water. At the end of the process the bones—now clean—were allowed to dry in the warm air of the laboratory and the whole skeleton and the teeth were ground up preparatory to submitting them to analysis for fluorine content.

Each group consisted initially of six rats, the mortality rate experienced during the experiment was low and no group lost more than one rat.

In order to provide an adequate basis of comparison, each trial consisted of at least four groups of rats; the four basal groups being: (i) those receiving the basal ration of rat nuts, (ii) those receiving the basal ration of rat nuts plus a fluorine compound, (iii) those receiving the basal ration of rat nuts plus the alleviator, and (iv) those receiving the basal ration of rat nuts plus the alleviator and the fluorine compound. In this way it was possible to determine that an excessive quantity of fluorine compounds was in fact being absorbed and stored in the bones (comparison of groups i and ii), the effect of any of the alleviators in depressing the absorption and storage

of fluorine compounds (comparison of groups ii and iv), and finally that the continued feeding of the alleviator was not having any deleterious effect (comparison of groups i and iii).

At first the basal ration for each group of rats consisted of standard rat nuts containing whole-meal flour 46 per cent., Sussex ground oats 40 per cent., fish meal 8 per cent., dried milk 3 per cent., dried yeast, cod-liver oil, and salt 1 per cent. of each. The fluorine compound and the alleviator were incorporated in the rat nuts.

At first attempts were made to estimate the daily consumption of rat nuts by each group, but difficulties were encountered in that discarded remnants of food dropped through the cage floors and became mixed with faeces. Consequently the method was adopted of feeding each group *ad lib.* but at the same time avoiding excessive waste. Ordinary tap-water was constantly available in the usual type of inverted bottle. In all trials each individual rat was examined and weighed once a week. The purpose of doing so was to detect any deterioration that might be attributed to the effects of the alleviator or the fluorine compound being fed. No clinical evidence attributable to fluorosis was detected in any of the rats and none of the groups showed signs of deterioration in general health or weight that was of any significance. Rats that died were subjected to a *post-mortem* examination and no common cause of death was encountered. Among the causes of death of rats that were excluded from the trial were neoplasm, middle-ear disease, enteritis, and pneumonia.

Details of Individual Trials

Trial No. 1

This trial commenced in June, 1952, and was directed to testing the long-term effect of feeding calcium carbonate as a fluorine alleviator. The four diets compared were:—

Group i. Standard rat nuts.

Group ii. Standard rat nuts plus 250 parts per million sodium fluoride.

Group iii. Standard rat nuts plus 5 per cent. of feeding chalk.

Group iv. Standard rat nuts plus 250 p.p.m. sodium fluoride and 5 per cent. of feeding chalk.

Towards the end of the trial the rats were killed off at short intervals, the average experimental period per rat was 378 days. The results are shown in Tables I and II.

TABLE I

AVERAGE INITIAL AND TERMINAL WEIGHTS OF RATS IN EACH GROUP

	Average initial weights, grammes	St. error	Average terminal weights, grammes	St. error
Group i	94·0	± 7·67	212·0	±14·45
Group ii	92·8	± 3·76	225·3	± 6·99
Group iii	94·6	± 5·60	216·0	± 8·23
Group iv	93·6	± 2·48	188·2	± 9·04

TABLE II

FLUORINE CONTENT OF BONES IN PARTS PER MILLION

	Average fluorine content in p.p.m.	St. error	Diet
Group i	981	± 44·4	Basal
Group ii	3,783	±130·8	Basal + 250 p.p.m. NaF
Group iii	726	± 47·8	Basal + 5 per cent. $CaCO_3$
Group iv	2,368	±178·1	Basal + 250 p.p.m. NaF + 5 per cent. $CaCO_3$

The rats in group iv showed a smaller average gain in weight over the experimental period than those of the other groups. The rats appeared healthy and the retardation of weight gain was not seen in groups in later trials receiving similar treatment.

These results show that the addition of 250 p.p.m. of sodium fluoride to the basal ration resulted in a significant average increase in bone-fluorine concentration of 2,802 ± 138.2 p.p.m. ($t_9 = 20.3$ $p > .001$). When 5 per cent. chalk was included along with this level of dietary fluorine the increase, as compared with the control, in bone-fluorine content was 1,387 ± 231.8 p.p.m. So over a period of 378 days with a diet containing 250 p.p.m. of added sodium fluoride the effect of 5 per cent. chalk was to depress the bone-fluorine content by 1,415 ± 221.2 p.p.m. This effect may be judged highly significant ($t_9 = 6.40$ $p > .001$). The depression of fluorine uptake thus shown by the rat skeletons amounted to 50.5 per cent. of the increase in fluorine content when uncontrolled by the alleviator. The addition of 5 per cent. chalk to the basal ration significantly lowered the bone-fluorine content by 255 ± 65.7 p.p.m. ($t_8 = 3.88$ $p > .005$).

Trial No. 2

This trial commenced in January, 1953.

The second trial was designed to investigate two points arising from the first trial. First the standard rat nuts containing 8 per cent. of fish meal had a calcium content that might have had some influence on the absorption of fluorine compounds. By reducing the proportion of fish meal to 4 per cent. and by increasing the proportion of Sussex ground oats from 40 to 44 per cent. a rat nut was produced that contained a lower calcium content. The respective calcium contents expressed as $CaCO_3$ were:—

Standard rat nuts ... 6.03 per cent.
Low fish meal rat nuts 2.88 per cent.

The second point was to compare the long-term effects on skeletal fluorine of different levels of fluorine intake.

With these two objects in view the second trial consisted of four treatments:—

Group v. Low fish meal rat nuts.

Group vi. Low fish meal rat nuts plus 50 p.p.m. sodium fluoride.

Group vii. Standard rat nuts.

Group viii. Standard rat nuts plus 250 p.p.m. sodium fluoride.

The average experimental period of each rat in this trial was 524 days—146 days longer than the first trial. The results are shown in Table III and Table IV.

TABLE III

AVERAGE INITIAL AND TERMINAL WEIGHTS OF RATS IN EACH GROUP

	Average initial weights, grammes	St. error	Average terminal weights, grammes	St. error
Group v	66·2	± 3·48	230·0	±11·30
Group vi	64·4	± 3·74	230·6	±13·60
Group vii	70·2	± 2·71	244·2	± 6·73
Group viii	63·0	± 3·29	209·7	±14·90

TABLE IV

FLUORINE CONTENT OF BONES IN PARTS PER MILLION

	Average fluorine content in p.p.m.	St. error	Diet
Group v	1,185	± 79·8	Low fish meal
Group vi	2,105	± 80·4	Low fish meal + 50 p.p.m. NaF
Group vii	1,134	± 29·1	Standard rate nuts
Group viii	3,358	±217·5	Standard rate nuts + 250 p.p.m. NaF

In this trial, treatment had no significant effect on live-weight gain. Bone fluorine was again significantly increased when sodium fluoride was included in the diet; the average increase in bone-fluorine content for 250 p.p.m. dietary fluorine being 2,224 ± 219.5 p.p.m. (t_9 = 10.13 p > .001) and for 50 p.p.m. of dietary fluorine 920 ± 113.4 p.p.m. (t_8 = 8.11 p > .001). The response to differing levels of dietary fluorine was not linear, higher levels showing relatively less effect. The effect of change in the amount of fish meal—comparison of group v and vii—was not significant.

Trial No. 3

This trial commenced in April, 1954.

Since the first trial had shown that 5 per cent. chalk was effective in reducing the fluorine content of bones when a very high content of a fluorine compound (250 p.p.m.) was fed, it was considered necessary to conduct a trial in which the concentration of fluorine compounds approximated to that more commonly encountered on the herbage in the neighbourhood of industrial undertakings. For this purpose a concentration of 50 p.p.m. of sodium fluoride was used and the third trial consisted of four groups:—

Group ix. Low fish meal rat nuts.

Group x. Low fish meal plus 50 p.p.m. NaF.

Group xi. Low fish meal plus 5 per cent. chalk.

Group xii. Low fish meal plus 5 per cent. chalk plus 50 p.p.m. NaF.

The average experimental period of each rat in this trial was 414 days. The results are shown in Table V and Table VI.

TABLE V

AVERAGE INITIAL AND TERMINAL WEIGHTS OF RATS IN EACH GROUP

	Average initial weights, grammes	St. error	Average terminal weights, grammes	St. error
Group ix	106·6	± 3·18	296·0	± 7·86
Group x	106·0	± 3·30	375·0	± 8·16
Group xi	103·2	± 4·17	246·0	± 4·96
Group xii	97·8	± 7·04	239·2	± 6·38

TABLE VI

FLUORINE CONTENT OF BONES IN PARTS PER MILLION

	Average fluorine content in p.p.m.	St. error	Diet
Group ix	1,002	±81·25	Low fish meal
Group x	1,427	±36·93	Low fish meal + 50 p.p.m. NaF
Group xi	720	± 9·38	Low fish meal + 5 per cent. chalk
Group xii	1,105	±62·64	Low fish meal + 5 per cent. chalk + 50 p.p.m. NaF

Groups ix and x are a repetition of groups v and vi of the previous trial, but with the experimental period curtailed by 110 days. The bone storage of fluorine is lower in the groups subjected to the shorter period, the average difference being 183 p.p.m. for the basal groups (groups v and ix) and 678 p.p.m. for the groups receiving 50 p.p.m. NaF (groups vi and x).

The effect of the inclusion of 5 per cent. $CaCO_3$ is again to limit the bone storage of fluorine—a difference of 282 ± 81.9 p.p.m. for the basal groups (ix and xi) and 322 ± 72.7 p.p.m. for the groups receiving 50 p.p.m. NaF (x and xii). Both these effects may be judged significant.

Trial No. 4

This trial commenced in January, 1955.

The results obtained from the trials described showed that calcium carbonate was effective as a fluorine alleviator. It was now necessary to investigate the value of combining an aluminium compound with calcium carbonate. For reasons to be discussed later, it was decided to use aluminium oxide in equal proportion with calcium carbonate and the amount of the combination—named for the sake of convenience "calcium aluminate" used as an alleviator was fixed at 5 per cent. of the food. At the same time it was decided to incorporate in this trial an observation on the effect of a virtually insoluble fluorine compound, namely calcium fluoride. Accordingly six groups of rats were set up in this trial:—

Group xiii. Low fish meal rat nuts.

Group xiv. Low fish meal rat nuts plus 5 per cent. of "calcium aluminate."

Group xv. Low fish meal rat nuts plus 100 p.p.m. sodium fluoride.

Group xvi. Low fish meal rat nuts plus 100 p.p.m. calcium fluoride.

Group xvii. Low fish meal rat nuts plus 5 per cent. "calcium aluminate" plus 100 p.p.m. sodium fluoride.

Group xviii. Low fish meal rat nuts plus 5 per cent. chalk plus 100 p.p.m. sodium fluoride.

The average experimental period of each rat in this trial was 135 days. The decision to restrict the period of this trial to approximately four months was partly due to a desire to secure the results of the comparison between calcium carbonate and calcium aluminate fairly quickly and partly due to the fact that the earlier longer trials had provided the essential fundamental information, and there seemed no reason to suppose a period of four months or so would not be adequate for the purpose of comparing the action of the two alleviators. The results are shown in Table VII and Table VIII.

TABLE VII

AVERAGE INITIAL AND TERMINAL WEIGHTS OF RATS IN EACH GROUP

	Average initial weights, grammes	St. error	Average terminal weights, grammes	St. error
Group xiii	208	± 3·81	235	± 3·87
Group xiv	204	± 4·94	229	± 6·12
Group xv	210	± 5·70	238	± 5·11
Group xvi	196	± 4·85	232	± 3·82
Group xvii	201	± 8·52	232	± 6·44
Group xviii	208	±10·34	232	± 5·88

TABLE VIII

FLUORINE CONTENT OF BONES IN PARTS PER MILLION

	Average fluorine content in p.p.m.	St. error	Diet
Group xiii	1,100	± 21·4	Low fish meal
Group xiv	930	±102·1	Low fish meal + 5 per cent. calcium aluminate
Group xv	1,510	± 60·8	Low fish meal + 100 p.p.m. NaF
Group xvi	1,180	±114·5	Low fish meal + 100 p.p.m. CaF_2
Group xvii	1,104	± 24·0	Low fish meal + 5 per cent. calcium aluminate + 100 p.p.m. NaF
Group xviii	1,365	± 67·4	Low fish meal + 5 per cent. chalk + 100 p.p.m. NaF

In this trial, treatment had no significant effect on live-weight gain. With a trial period of 135 days the lowering of the bone storage of fluorine, as a result of the inclusion of 5 per cent. calcium aluminate, was 170 ± 104.4 p.p.m. for the basal groups (xiii and xiv) and 406 ± 65.3 p.p.m. for the groups receiving 100 p.p.m. sodium fluoride (xv and xvii). Indeed 5 per cent. calcium aluminate would appear to alleviate completely the effects of the inclusion in the diet of 100 p.p.m. sodium fluoride. Calcium aluminate at a level of 5 per cent. appears to be superior to 5 per cent. calcium carbonate in its effects with an average difference of 261 ± 71.6 p.p.m. of bone fluoride ($t_9 = 3.65$ $p < .01$).

The uptake of fluorine from a diet containing 100 p.p.m. of calcium fluoride was less than from a diet containing the same proportion of sodium fluoride; with calcium fluoride the bone-fluorine content did not differ significantly from that of the control group.

Discussion

The object of these trials was primarily to investigate whether on a long-term basis the absorption of fluorine compounds could be prevented to a sufficient extent in rats to justify trials of fluorine alleviators in farm stock. The criterion by which the results were judged was the fluorine content of the skeletons at the end of the trials. As it was impracticable—if not impossible—to remove sufficient bone from the rats at the beginning of each trial for fluorine estimation, each trial contained a group of rats fed on the basal diet and the fluorine content of the skeletons of that group were used as the baseline against which the results were judged.

In the case of ruminants, if the fluorine alleviator is given once daily in some foodstuff, a concentration of the alleviator can be built up in the rumen contents and is maintained by daily intake. The mechanism of rumen digestion entails a process of mixing newly ingested food with the rumen contents, removal of foodstuff from the rumen is a gradual process. The presence in the rumen of the alleviator in sufficient concentration ensures that it comes in contact with fluorine compounds ingested with newly swallowed foodstuffs. The continuous process of churning that goes on in the rumen ensures that the fluorine compounds come in contact with the alleviator virtually as soon as they are swallowed. In order to imitate as far as possible this continuous process in the ruminant it was considered that in rats the fluorine alleviator should be mixed with the food.

The earlier trials indicated that 5 per cent. of calcium carbonate was effective in limiting the uptake of fluorine compounds added to the diet and that these results could be obtained with both a very high concentration of fluoride (*i.e.* 250 p.p.m. sodium fluoride) and a lower concentration (*i.e.* 50 p.p.m. sodium fluoride). Though these results were encouraging—indeed more encouraging than had been sanguinely expected—it was felt desirable to go further and investigate the possibility of a combination of calcium carbonate and an aluminium compound proving more effective. The choice of an aluminium compound raised certain problems. There were three compounds that could have been used, aluminium sulphate, aluminium chloride, and aluminium oxide. An important consideration was palatability. Anderson (1954) had commented on the difficulty of getting animals to consume aluminium sulphate and aluminium chloride because of the unpleasant taste. While this could in part be overcome where animals were fed indoors and the aluminium salt was mixed with the large bulk of the animal's daily food, it could not be conveniently overcome in the case of grazing animals to which only a small daily ration

was to be fed as a vehicle for the fluorine alleviator. On the grounds of palatability it was decided to choose aluminium oxide.

The next consideration was any question of toxicity when these compounds were fed for long periods. No information could be obtained as to the possible toxicity of aluminium sulphate or aluminium chloride but there seemed to be no good reason for suspecting that aluminium oxide would have any long-term toxic effect.

The third consideration was whether any one of the three compounds was more likely to be effective as an alleviator. As the action of aluminium compounds has been stated by Sharpless (1936) to be of a physical rather than a chemical nature, there seems to be no good ground for preferring one compound more than another. So taking all these considerations into account it was decided to use aluminium oxide in conjunction with calcium carbonate. The decision to use equal proportions of calcium carbonate and aluminium oxide was purely arbitrary, and it might be said that the decision to use 5 per cent. of the mixture was also arbitrary. McGirr (1956) stated that he had no fear of long-term toxic effects from either aluminium sulphate or aluminium chloride but he did not think it mattered which compound of aluminium was used for in each case aluminium hydroxide was formed in the gut and it was that compound which acted as the alleviator.

The results of the comparison between calcium carbonate and " calcium aluminate " (equal parts of calcium carbonate and aluminium oxide) show that fed at a level of 5 per cent. " calcium aluminate " is more effective than calcium carbonate. The results with " calcium aluminate " appear to indicate a high level of efficacy as a fluorine alleviator, but it must be obvious that further and more extended observation would be required before such a high level of efficacy could be claimed.

The results of the trials do amply justify carrying out field trials with grazing animals. To do so the number of animals including controls must be sufficient to give results that will be significant. To achieve such numbers it is necessary to confine such a field trial to a test of one particular alleviator. From the results obtained in the trials with rats it seems to be shown that the most promising alleviator for field trials is the mixture in equal proportions of calcium carbonate and aluminium oxide.

As during the course of the trials different concentrations of sodium fluoride were added to the diets and the rats were subjected to the adulterated diets for varying lengths of time it was possible by studying the results obtained with the different groups of rats to show that the fluorine content of bone is dependent on two factors: (1) the concentration of fluorine compounds in the diet and (2) the length of time the animals had been ingesting the fluorine-containing diet. In these trials the fluorine content of the diet was kept at a constant level, naturally fluctuations in the fluorine content of the diet, such as inevitably occur under field conditions of industrial contamination, would exert a further influence on the build-up of the fluorine content of bone. Furthermore it has been shown in these trials that the solubility of the fluorine compound has at least some influence on the uptake of fluorine as measured by the proportion present in bone. It may well be that this question of solubility has an important bearing on the significance of herbage analyses in relation to clinical manifestations and may in part explain the discrepancies encountered when the figures and findings in different areas are compared.

Summary

A series of feeding trials with rats designed to test the long-term effect of feeding fluorine alleviators are described. The criterion of efficacy employed was the extent to which the uptake of ingested fluorine in bone was depressed by the alleviator as compared with the uptake in rats which had been fed the same amount of fluorine without an alleviator.

Three concentrations of sodium fluoride were used in the trials, 50 p.p.m., 100 p.p.m., and 250 p.p.m.

In the earlier trials the alleviator, calcium carbonate as 5 per cent. of feeding chalk in the diet, depressed the storage of fluorine compounds in the rat skeletons. In the group of rats receiving 250 p.p.m. sodium fluoride and 5 per cent. chalk the increase in fluorine content compared to the basal group was less by 50.5 per cent. than that of the group receiving 250 p.p.m. of sodium fluoride.

The alleviator action of equal parts of calcium carbonate and aluminium oxide (" calcium aluminate ") was compared with that of calcium carbonate alone. Calcium aluminate was found to be much more effective than calcium carbonate alone, and showed a very high degree of effectiveness. Further confirmation of this degree of effectiveness is required.

These trials with rats made it possible to define some of the factors governing the build-up of fluorine concentrations in bone.

Acknowledgments.—In the earlier part of these trials the fluorine estimations of the rat skeletons were carried out by the late Dr. James Stewart, Biochemist at the Moredun Institute of the Animal Diseases Research Association, Edinburgh. I was much indebted to the late Dr. Stewart for his help in this respect.

For the later part of these trials the analyses were done by the Biochemical Department of the Veterinary Laboratory of the Ministry of Agriculture, Fisheries and Food, at Weybridge. I am indebted to Mr. J. L. McGirr for his welcome help in arranging this to be done in the Department of which he is the head.

The staff of the Department of Veterinary Pathology of Edinburgh University carried out *post-mortem* examinations of rats that died during the trials and to them I am grateful for this service.

It is a pleasure to acknowledge the help I have received from Dr. H. Paver in connexion with analysis of the results of these trials.

Finally, I must refer to the help I have received from the technical staff of my own department for their day-to-day care of the rats and their work in connexion with preparing the skeletons for analyses.

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Routine Investigations into Mycotic Abortion

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REPORTS of the association of fungi with unexplained bovine abortion have appeared at infrequent intervals since Theobald Smith first called attention to the condition in 1920. Some 280 spontaneous abortions have so far been reported associated with 16 different species of fungi, *Aspergillus fumigatus* accounting for 148 cases and *Absidia ramosa* and *A. corymbifera* for 41. The other species have occurred only sporadically.

Bendixen & Plum (1929) described in detail 17 cases of mycotic abortion in which the characteristic changes in the placenta following fungal infection were observed and made acceptable proposals on the epidemiology of the condition. They also reproduced abortions experimentally in five of six pregnant cows injected intravenously with the spores of both *Aspergillus fumigatus* and *Absidia ramosa*, as had Gilman & Birch (1925) in one out of five cows similarly inoculated with a *Mucor* sp. Weidlich (1952) appears to have been the first person to have recorded skin lesions on a foetus from an abortion of this type, and subsequently Engel & van de Maas (1955), van Ulsen (1955), and Rowsell (1955) have all seen foetal skin infection.

Interest in mycotic abortion in this country was stimulated during the Agricultural Research Council's Survey of Animal Mycoses (Ainsworth & Austwick, 1955a, b) when 52 cultures from bovine foetal stomach contents were received from Veterinary Investigation Centres in different parts of the country. Of these, eight were mixed cultures or were grossly contaminated, but the remaining 44 were the only organism isolated.

Judging from the relatively large number of cases reported in such a short time, it appeared that fungi might be more prevalent in aborted foetuses than hitherto suspected, and in the early spring of 1955 the two routine surveys reported here were undertaken independently at the Bristol Veterinary Investigation Centre, and at the Veterinary Laboratory, Weybridge, in order to assess the frequency of the condition.

Sources of Material

Routine examination of foetal material for the common pathogenic organisms responsible for abortion was already being carried out at Weybridge in the Department of Breeding Diseases under Mr. J. R. Lawson and in the normal course of investigations at the Bristol Veterinary Investigation Centre. These were, therefore, extended to include a mycological examination. The material was received from veterinary surgeons in the counties of Dorset, Hampshire, Surrey and West Sussex, and of Gloucestershire, Herefordshire, Somerset, Wiltshire, and Worcestershire. The type of specimen received varied considerably. Usually a whole foetus was available, sometimes with its placenta, but occasionally only the placenta or a piece of it or the foetal stomach were sent. For the purposes of this account the observations at Weybridge are chiefly restricted to foetuses, but those made at Bristol include a study of 51 placentae.

Methods

Direct Examination. Macroscopical and microscopical examination of the stomach content for the presence of hyphae was carried out on every foetus by direct inspection of the fluid withdrawn from the stomach in a sterile boiling tube, and microscopically in a wet slide-mount. When complete foetal membranes were available the amniotic fluid was also examined and the cotyledons searched for hyphae by means of crush preparations. The skin lesions on two foetuses were also examined directly for hyphae by mounting small pieces in saline or lactophenol-cotton blue. Portions of the stomach contents were placed in a refrigerator for subsequent examination if necessary and, for further study, portions of the foetal skin, the stomach wall, and the necrotic cotyledons were fixed in 10 per cent. formol-saline.

Cultural Examination. At both centres 2 per cent. malt extract agar was used as the isolation medium (*p*H 5.5), but at Weybridge a supplement of 20 units of penicillin and 40 units of streptomycin per ml. were added to inhibit bacterial growth (Georg *et al.*, 1951). Different inoculation methods were employed

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"Fluorine Alleviators."—*Concluded*

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(A fuller list of references to fluorosis and fluorine alleviators was given in the paper "Fluorine Alleviators," a review published in THE VETERINARY RECORD for October 29th, 1955, Vol. 67, pp. 827–830.)

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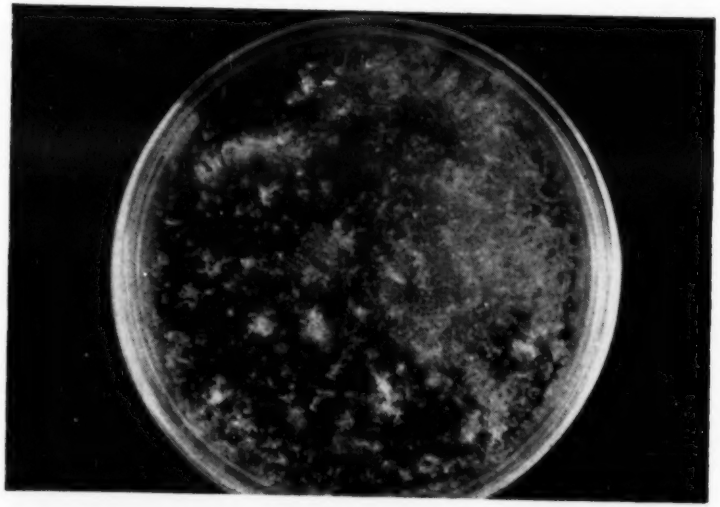

FIG. 1.—Stomach contents of aborted foetus containing hyphae of *Aspergillus fumigatus*. (A.204.)

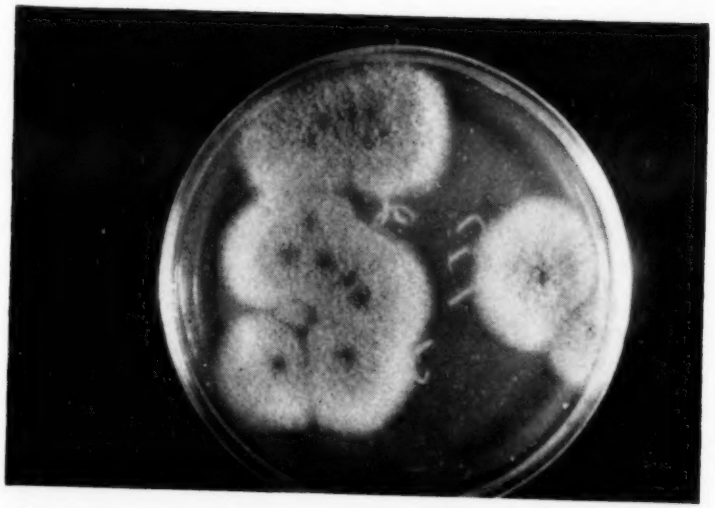

FIG. 2.—*Aspergillus fumigatus* growing from foetal stomach smear on malt agar. Incubated 72 hours at 25° C. (A.234.)

FIG. 3.—Skin lesions on foetus associated with *Aspergillus fumigatus*. (A.283.)

FIG. 4.—Skin lesions on foetus associated with *Aspergillus fumigatus*. (A.204.)

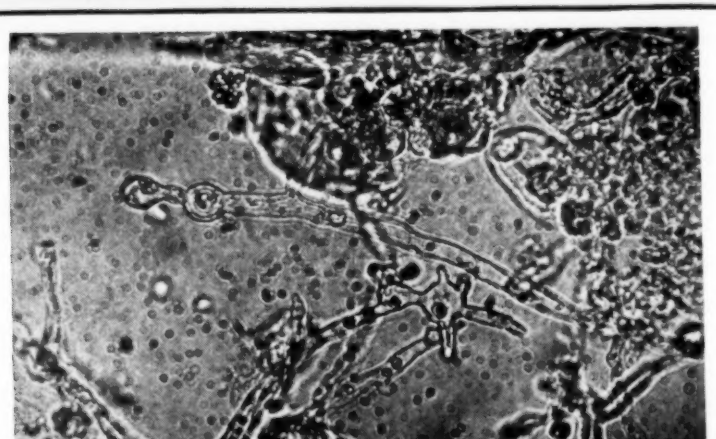

FIG. 5.—Hyphae of *Absidia ramosa* in foetal stomach contents. × 750. (A.295.)

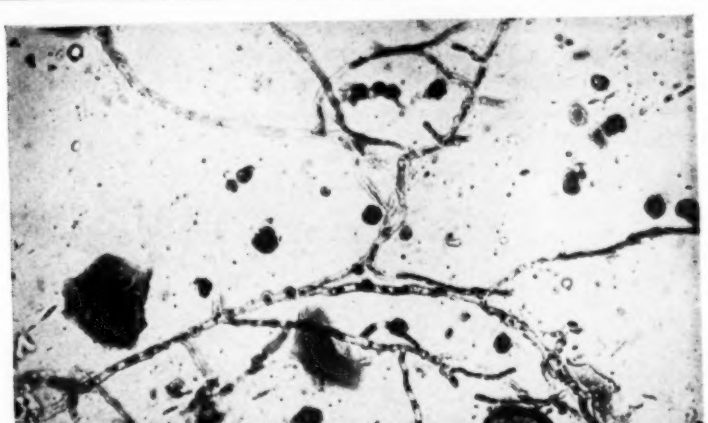

FIG. 6.—Hyphae of *Aspergillus fumigatus* in foetal stomach contents. Stained with cotton blue in lacto-phenol. × 300. (V.819.)

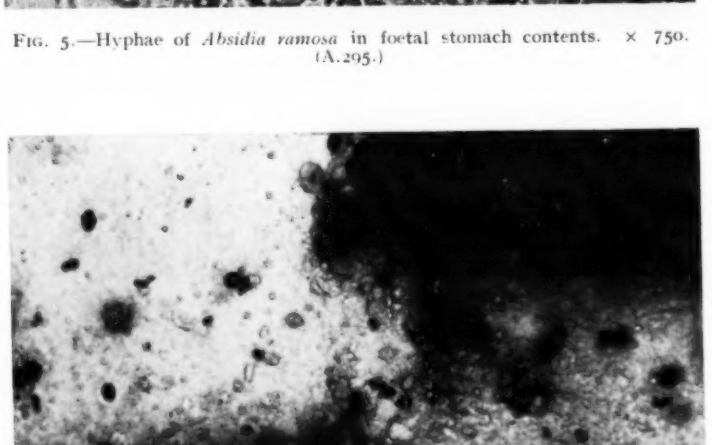

FIG. 7.—Yeast cells and pseudomycelium of *Candida tropicalis* in foetal stomach contents. Stained periodic acid-Schiff technique. × 300. (A.37.)

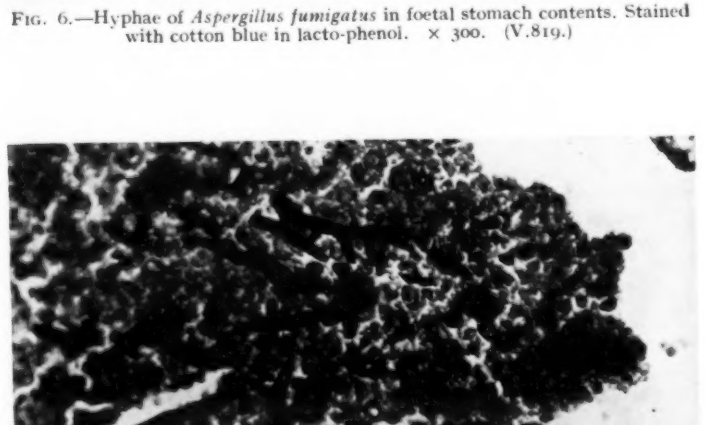

FIG. 8.—Hyphae of *Aspergillus fumigatus* in necrotic cotyledon. × 500. (V.875.)

for the stomach contents. At Bristol a malt plate was inoculated with four separate drops of the fluid and incubated at 25° C. At Weybridge initially a small loop was used to make a normal streak over the surface of the plates, but later a glass spreader was substituted in order to distribute the 0.5 ml. of the stomach content extensively over the plate because it was found that the fungus colonies in the stomach content tended to wrap round the loop instead of being deposited on the surface of the agar. Two plates were prepared from each stomach content, one being incubated at 25° C. and the other at 37° C. Pieces of placental material were plated out direct at both laboratories. The plates were examined after 24 and 48 hours and at intervals up to one week, when only those plates showing developing colonies were retained.

Results

The surveys each covered one year. From March 1st, 1955, to February 29th, 1956, at Bristol, and from February 14th, 1955, to February 13th, 1956, at Weybridge. During this time 278 and 323 foetuses and foetal stomachs and 51 and 1 placentae were examined respectively.

The total number of foetuses found to be infected by fungi at the two centres was remarkably close, and the relative abundance of the different significant species was virtually the same. Assessment of the significance of the fungi found has been made firstly on the basis of the apparent absence of any demonstrable infection by *Brucella abortus*, *Vibrio fetus*, or any other pathogenic bacteria which might have been responsible for the abortion. The second criterion has been the presence of fungal hyphae or of yeast cells in the stomach content and/or the placenta as shown by direct examination or by the stained smears, and the third, the extensive growth of the fungus in pure culture which occurred in all but two cases. All positive cases at Bristol were bacteriologically sterile.*

Under these conditions those cases classed as negative included all those foetuses in which no significant organisms could be detected. The second criterion was only partially fulfilled at Bristol where eight foetuses only had hyphae present in their stomach contents, whereas all 23 of those at Weybridge showed their presence (including one with yeast cells) (Fig. 1). This result may indicate that placental infection may occur without the presence of hyphae in the foetal stomach content and, perhaps, represents an early phase of the infection. All 18 foetuses at Bristol and 21 of those at Weybridge gave a pure growth of a fungus on culture (Fig. 2) and the species concerned always had the same hyphal morphology as the hyphae observed directly.

The fungi isolated are listed in Table I.

* The presence of non-pathogenic bacteria in all the accepted cases at Weybridge may be due to the fact that most of the foetuses received at this Laboratory had come through the post, and therefore, had almost always been aborted at least 24 hours previously, whereas at Bristol the majority were delivered direct from the farms.

TABLE I

	Weybridge	Bristol	Total
Absidia ramosa	3	1	4
Mucor sp.	—	2	2
Rhizopus sp.	—	1	1
Mucoraceous fungi (indet.)	3	—	3
Aspergillus fumigatus ...	15	14	29
Candida tropicalis ...	1	—	1
Polystictus versicolor (?) ...	1	—	1
Totals	23	18	41

At Bristol 18 isolations of fungi were not considered as significant because they were associated with gross bacterial growth (*i.e.* 7 per cent. of the samples negative for fungi), even though eight of them were of *Aspergillus fumigatus*. The isolation plates from the samples classed as negative at Weybridge, however, had a far higher percentage of fungi present (69 per cent.) and *Aspergillus fumigatus* occurred on 28 of the 240 plates giving fungal colonies, although in all but two cases there were either less than three colonies on the plate or there was gross fungal and bacterial contamination. Only 70 of the plates here were mycologically sterile (21.6 per cent.) at both temperatures.

Occurrence of Foetal and Placental Lesions

Placental Lesions. Bendixen and Plum described the changes that took place in some of the fungal-infected placentae examined and they came to regard certain of these as characteristic for mycotic abortion, perhaps enabling a tentative clinical diagnosis to be made. These placental lesions were chiefly concerned with the adherence of the maternal part of the cotyledon (the caruncle) to the chorionic part, so that these organs appear as raised, solid, yellowish, cushion-like structures often with a raised and thickened margin. The intercaruncular areas of the chorion were also seen by these authors to be covered with small raised, yellowish, leathery lesions which, however, were not considered as diagnostic.

During the present surveys one placenta was seen to have such characteristic changes, which involved a single cotyledon, but it seems likely that several of the earlier placentae received were not examined critically enough and that these too may have shown necrosis. Subsequently, six out of seven placentae from suspected cases of mycotic abortion have shown this failure for proper dehiscence to take place (Austwick, unpublished). Hyphae of *Aspergillus fumigatus* were readily detected by direct examination in this cotyledon and in others on the same placenta which had dehisced in the normal manner (Fig. 8).

Foetal Skin Lesions. The skin lesions described previously from aborted bovine foetuses and those reported by Paterson (1953) have all been of the discrete type, usually up to 40 mm. across and slightly raised. One such foetus was found in this investigation (No. A.283, Fig. 3). This was about seven months old with a crown-rump measurement of 580 mm. with the hair just appearing. Fourteen small, raised, greyish-buff, soft lesions, 8 to 15 mm. in

diameter, were found on the body: two on the head and neck, eight about the centre line of the back, and four on the flanks. Hyphae were observed directly in these lesions but no other parts of the skin or internal organs showed lesions, even though copious hyphae were found in the stomach contents. *Aspergillus fumigatus* was isolated from the stomach content and skin lesions.

Another foetus had skin lesions of a different type (No. A.204) and was about three to four months old with a crown-rump measurement of 270 mm. (Fig. 4). Diffuse whitish areas were present on the flanks and more especially in the axillae, under the neck, and inside the hocks. The skin in these parts was not raised or in any way inflamed, but was extensively invaded by hyphae. Fragments of skin from these areas and pieces of a soft, yellowish material from the ears and mouth all gave *Aspergillus fumigatus* on culture. The placenta accompanying this foetus showed the changes described above whilst the amniotic fluid and the stomach contents were similar to each other in appearance, containing clumps of hyphae clearly visible to the naked eye. *Aspergillus fumigatus* was also isolated from the placenta and all parts of the alimentary canal of the foetus, but not from the other internal organs.

Results of Microscopical Examinations

When the stomach-content smears were stained by the Periodic acid-Schiff technique, hyphae were observed in 22 of the Weybridge cases and yeast cells in the remaining one. In each case, both examination of the fresh stomach contents and the stained smears showed hyphae of a distinct type. *Aspergillus fumigatus* was characterised by narrow, evenly outlined, branching, septate hyphae (1.5 to 3.0 μ diameter) (Fig. 6) and the *Absidia* species by wider, frequently branching hyphae (2.5 to 7.5 μ diameter) largely without septa but with frequent and sometimes thicker-walled swellings (Fig. 5). The isolate of *Polystictus versicolor* was associated with very narrow, moderately thick-walled, aseptate, branching hyphae (2 to 3.5 μ diameter) characteristic of a monosporous isolate of this species. The single yeast obtained in pure culture was *Candida tropicalis*, the oval budding cells of which (2 to 5 μ by 3 to 7 μ) were present in tremendous numbers in the stomach content (Fig. 7).

In all cases in which placentae had been found infected on direct examination when fresh, hyphae were also observed in the stained sections (P.A.S. technique) and it was again possible to distinguish between the *Aspergillus* and the mucoraceous type. Preliminary investigation of the histopathology of the placental lesions showed close correspondence with the descriptions of similar lesions by Bendixen & Plum (1929, p. 265), but the foetal skin lesions have not been studied in detail.

Assessment of the Cultural Results

When stomach contents were used as inoculum, the fungal growth which occurred was generally pure but varied greatly in quantity. Those plates inoculated at four points almost always gave growth at each point in positive cases, but when the spreader technique was used the number of colonies of the significant fungus appearing per plate varied from 239 to as low as four, even though hyphae were observed in the inoculum on each occasion. No doubt this variation was due to the density and probably the size of the hyphal groups in the stomach contents, but it caused considerable difficulty in deciding the significance of the low numbers of colonies of some moulds, especially *Aspergillus fumigatus*, which might have come from air-borne contamination during inoculation. Generally the speed with which the colonies developed (the appearance within 24 hours was usual for stomach contents containing this and the *Absidia* species) and the growth from an area within the smear were satisfactory guides.

Isolations from placentae were not so satisfactory because of the high rate of contamination from air-borne fungal spores and bacteria, but in all cases copious growth of a fungus was obtained which corresponded in morphology to that seen in the placental tissue. On two occasions, although hyphae were found in the stomach contents, no isolate was obtained in culture. In each case the hyphae were of the mucoraceous type and had appeared already moribund on the direct examination. Such behaviour has been encountered in these Phycomycetes on several occasions and has been shown by Rolle & Kolb (1954) to be most probably due to the presence of toxins of bacterial origin.

Seasonal Occurrence and Age Incidence

A winter rise in the number of cases of mycotic abortion diagnosed at Weybridge was shown to correspond almost exactly with that reported during the A.R.C. Survey of Animal Mycoses, 18 cases being reported between December and May, inclusive (73.9 per cent.) and five between June and November, inclusive (26.1 per cent). The corresponding figures for Bristol were 10 (55.0 per cent.) and eight (45.0 per cent.).

Complete figures are not available for the ages of the foetuses concerned but they were mostly between three and seven months old. It has not, therefore, been possible to confirm the results of Plum (1932) who found that most mycotic abortions occurred during the latter half of pregnancy.

Epidemiology

The route and source of the spontaneous infections remain unknown at present, although there is considerable evidence that mouldy hay constitutes the main habitat for most of the fungi recorded from abortions (Ainsworth & Austwick, 1955b). Bendixen and Plum were of the opinion that infection was primarily pulmonary and that it was carried in the blood to the placenta in which favourable conditions for fungal growth occurred. They failed to reproduce the condition by feeding cultures of *Aspergillus fumigatus* and *Absidia ramosa*. Van Ulsen (1955) noted that the percentage of mycotic abortions was doubled following the wet summer of 1954 which had provided poorer fodder than in the previous year.

Infection *per vaginam* was suggested by Rollinson & Haq (1948) because of their isolation of *Absidia corymbifera* from the preputial washings of a bull which had served two aborting cows.

During the present investigations it was not possible to follow up any of the cases to determine the environmental conditions.

Discussion

In considering these cases of abortion we have applied rigid criteria of examination to exclude any suspect foetuses or placentae which were grossly contaminated with bacteria or with other fungi. None of the accepted cases was found to be associated with any other pathogenic organism known to cause bovine abortion. It is known that of the fungi isolated, at least *Aspergillus fumigatus* produces an antibacterial substance (Oxford & Raistrick, 1942) which might kill any pathogenic bacterium present within or adjacent to the foetus, but it is not thought that this provides a satisfactory explanation of this type of abortion. Those bacteria recovered in association with fungi in excluded cases at Bristol were of a type generally regarded as contaminants (*Escherichia coli, Bacillus subtilis,* and *Proteus* spp.), and the foetus often showed signs of decomposition.

The most surprising result of these surveys has been the close correspondence of the percentages of fungal-infected foetuses and placentae for the two areas; 7.1 per cent. (all foetuses) at Weybridge and 6.4 per cent. at Bristol. These figures were obtained quite independently and by somewhat different techniques from a wide range of material, and they compare well with those of Plum (1932) who gave a 5.9 per cent. fungal infection rate in placentae. The more recent figures of van Ulsen (1955) and Hess & Brunner (1949) of 1 to 2 per cent. and " sporadic " respectively are much lower.

It is interesting to compare these percentages with those given for other causes of abortion by Lawson & MacKinnon (1952). At Weybridge during the years 1947 to 1951, 16.7 per cent. of all abortions from which material was received showed infection by *Brucella abortus* and 8.6 per cent. were due to *Vibrio fetus*. A few were ascribed to other bacteria but almost 75 per cent. of the abortions were unexplained. Even if only 5 per cent. of these undiagnosed abortions could be attributed to fungal infection in this country, it would indicate a very considerable economic loss.

In spite of ample evidence of the ability of certain pathogenic fungi to cause abortion in cattle and the confirmation by the experimental work of Bendixen and Plum, mycotic abortion is not yet regularly diagnosed on a routine basis. Laboratory procedure for diagnosis requires the direct examination of the foetal stomach contents and the placenta, followed by culture of both on a suitable medium. For this purpose we have successfully used 2 per cent. malt extract agar with or without a penicillin and streptomycin supplement, and find that incubation at 37° C. is probably adequate for most of the fungi concerned.

In general, the occurrence of hyphae in the foetal stomach content and in the cotyledons is a reliable guide to diagnosis but cultural confirmation is necessary to identify the species of fungus concerned.

Summary

Attempts to diagnose mycotic abortion in cattle on a routine basis have shown that the condition may be recognised regularly by the direct and cultural examination of aborted foetuses and their associated placentae. The presence of hyphae in the foetal stomach content and in the necrotic cotyledons, together with the isolation of the fungus in pure culture, were the chief criteria employed. 601 foetuses and 52 placentae were examined by these methods and 41 cases of mycotic abortion diagnosed (average 6.2 per cent.). The fungi most frequently isolated were *Aspergillus fumigatus* (29 cases) and *Absidia ramosa* (four cases). The first records of a yeast (*Candida tropicalis*) and a basidiomycete (*Polystictus versicolor* ?) from this type of abortion are reported. Placental lesions of a characteristic type and discrete and diffuse foetal skin lesions were all observed on single occasions. The frequency of the condition in relation to other known causes of abortion suggests that it is of considerable economic importance.

Acknowledgment.—At Weybridge we are indebted to Mr. J. R. Lawson for permission to carry out mycological examination of the aborted foetuses sent in for bacteriological examination, and to Messrs. D. Maley, B. Vickers, and other technical staff for routine help in the isolations. Mrs. J. D. Cartner assisted in the subsequent examinations. At Bristol, Mr. S. G. Hewitt kindly assisted in the investigations. Our thanks are also due to Dr. W. P. K. Findlay of the Forest Products Research Laboratory, Princes Risborough, for the provisional identification of *Polystictus versicolor*.

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The Disciplinary Committee of the R.C.V.S.

A meeting of the Disciplinary Committee was held on April 10th at the Royal College.

Mr. James Bhattacharjee

The Committee considered the case of Mr. James Bhattacharjee, which had been adjourned from its last meeting on February 14th. Mr. Bhattacharjee, who had been Director of Veterinary Services to the Union of Burma, had been found guilty in his own country on nine charges under the Corruption Act. He had been accused of drawing wages for non-existent labourers alleged to be on his staff, and had been sentenced to two years imprisonment on December 10th, 1954. At the previous meeting of the Committee the Registrar had read a letter from Mr. Bhattacharjee, explaining that he had not the means to travel to England or to be legally represented; he had undertaken to submit his defence in the form of an approved statement.

Mr. Baylis, acting for the Royal College, said that he had received a letter from Mr. Bhattacharjee, dated March 22nd, which he thought the Committee would wish to consider. Copies of the letter were handed to the members of the Committee. In it Mr. Bhattacharjee described the system by which wages had been paid in his office. The accountant was responsible for preparing the pay bills, which were checked and certified correct by the superintendent. They were then brought to Mr. Bhattacharjee for his signature. His plea was that the superintendent had forged the names of two non-existent workers, but that he himself was so busy he did not know how many workers were, in fact, employed. He claimed, therefore, that the prosecution had never proved its case.

Mr. Baylis's submission was that the Committee was not entitled to go behind the conviction of a properly established court, either English or Burmese, and was therefore bound to accept a proved certificate of conviction without regard to the accused's plea of innocence. The Chairman agreed that this was the precedent that the Committee had hitherto followed. The parties withdrew while the Committee debated *in camera*. When they were readmitted the Chairman said:

"Mr. Baylis, the decision of the Committee is that they find the conviction proved. Secondly, they find that conviction constitutes conduct disgraceful in a professional respect, and a further finding is that Mr. Bhattacharjee's name be removed from the Register."

Mrs. Betty Phipps (née *Richards*)

This lady appeared before the Committee under her maiden name, on the following charge:—

That she gave an interview to a newspaper reporter leading to an article published on November 24th, 1956, in which the full address of her professional surgery was given, the nature of her practice was made clear, and passages were included which might be taken as praise for her professional work and an incitement to readers of the newspaper to consult her.

On November 24th, 1956, there appeared in a local newspaper an article under the title "Her Work with Animals is a Labour of Love," which, it was stated, identified Miss Richards directly, and included a photograph, her professional address, and a description of her practice. The article contained a number of statements purported to have been made by Miss Richards herself. Mr. Baylis, appearing for the Royal College, drew the Committee's attention to Paragraph A.18 of the Guide to Professional Conduct, which reads: "It is a disciplinary offence for a practitioner to attempt to secure clients or to gain reputation by means of any kind of advertisement whether direct or indirect," and submitted that since the article appeared in a newspaper circulating in the neighbourhood where Miss Richards practised, it might be interpreted as an invitation to consult her professionally, and therefore constituted a breach of the professional code.

Miss Richards, who was not legally represented, pleaded not guilty to any form of advertising. Cross-examined by Mr. Baylis, she agreed that she had given an interview to a newspaper reporter, but said that it had been on the spur of the moment. She realised it would appear in the newspaper, but added that had she seen it before publication she would have withdrawn it. She described some of the references to her professional work as inaccurate, and said that as her practice was already large she did not need to advertise and would never knowingly do so. The parties then withdrew and the Committee deliberated *in camera*. The parties having been readmitted, the Chairman addressed Miss Richards as follows:—

"Miss Richards, the Committee have found you guilty of conduct disgraceful in a professional respect. They are satisfied that you acted thoughtlessly and without a full realisation of the possible implications of what might follow from this interview and consequently they have decided not to remove your name from the Register. They have asked me, however, to warn you as to your future conduct, and we would suggest to you that you should be particularly careful in your dealings with the Press."

QUINTUPLET LAMBS

Quintuplet lambs were delivered by caesarean section carried out recently by a Whitby veterinary surgeon. They were born to a four-year-old half-bred ewe owned by Mr. George Pearson of Eskdalegates Farm, Sleights, and mother and lambs all survived. A farm-hand took the ewe to the surgery in a van—one passenger on the outward journey turned to six for the return.

News and Comment

ACCOMMODATION AT CONGRESS

We are asked to remind those members of the Association who intend to be present at Congress but who have not yet reserved accommodation of the necessity to do so in the very near future. There is still a certain amount of college accommodation available, but this cannot be held indefinitely.

The honorary secretary of the Provisional Committee, Dr. P. Storie Pugh, would like to hear from members *at their very earliest convenience*. His address is: Department of Veterinary Clinical Studies, University of Cambridge, Madingley Road.

R.C.V.S. DAY

The Council of the Royal College has decided this year to hold what may be described as a day of dedication and of celebration on the occasion of its Annual General Meeting. The intention is to signify the unity of the profession, and its place in the public life of the country. The arrangements for the day, Wednesday, June 5th, will be as follows:—

At 11.30 a.m., at the Queen's Chapel of the Savoy, there will be a corporate Service of the College and a Commemoration of Benefactors. The Service will be conducted by the Rev. Cyril L. Cresswell, C.V.O., M.A., F.S.A., Chaplain of the Royal Victorian Order, the newly appointed Chaplain to the Royal College. He will be assisted by the Rev. G. A. Willis, B.V.SC., M.R.C.V.S. The Service will be choral, with the choir of the Queen's Chapel. As there will only be 174 seats available, admittance will be by ticket only, and these may be obtained from the Registrar at the Royal College for members and for their ladies.

The Service will be followed by a luncheon at the Savoy Hotel, at 12.30 for 1 o'clock. The Minister of Agriculture will propose the toast of the profession. Sir Philip Morris, C.B.E., M.A., LL.D., the Vice-Chancellor of the University of Bristol, will reply for the guests.

The Council has given much thought to the convenience of the profession. and it has decided that a luncheon would enable more members and their guests to be present than a formal dinner. It has also thought that it would be preferable to charge an inclusive sum to cover everything, and has therefore agreed with the Savoy Hotel a charge of three guineas for each person present. This will be fully inclusive of cocktails at the reception before the luncheon, choice of wine, liqueurs with coffee, cigars, cigarettes, and all gratuities.

At 3.45, following the luncheon, the Annual General Meeting of the Royal College will be held at the College. Tea will be served in the College to members and their ladies present, and there will be an exhibition of historical documents and other material connected with the profession.

It will be appreciated that in Chapel, at luncheon, and in College accommodation is limited and therefore members of the profession are asked to make application to the Registrar, stating the number of their guests *as soon as possible*.

This, clearly, will be a notable day in the life of the profession which veterinary surgeons will not wish to miss, and places are liable to be very much in demand. To avoid disappointment, therefore, readers are urged to write to the Registrar without delay.

VETERINARY SURGEON AS TEST CRICKETER

Our readers may be interested to learn that the West Indies cricket team at present touring in this country numbers a veterinary surgeon among its members. He is Mr. F. C. M. "Jerry" Alexander, who qualified at Cambridge University last summer. Mr. Alexander, who gained a double blue for cricket and soccer represented the English amateurs and was also picked for the Olympic soccer side. He played in the F.A. Amateur Cup Final in 1956 for Corinthian Casuals. Soon after his return to Jamaica he was selected to tour with the West Indies cricket team as their first wicket keeper and is in line for a place in the forthcoming test series.

DISEASES OF POULTRY

We are indebted to a correspondent for the following notes on a special Course, under the title above, arranged by the British Council and held at the Ministry of Agriculture Veterinary Laboratory, New Haw, Weybridge. The Course, which was held from April 1st to April 13th, was the first to be held in the field of the diseases of poultry.

The representatives of the Council advertised the Course abroad and received many more applications than it was possible to accept. It was the intention to have about 12 members owing to the accommodation available and the wish to keep the Course on a personal basis. All applicants were required to be veterinarians, able to understand spoken English, and working on poultry disease investigations. The programme was as follows:—

The Poultry Industry in Great Britain: L. Hughes, M.R.C.V.S., Deputy Chief Veterinary Officer, Animal Health Division, Ministry of Agriculture. Visit to the Commonwealth Bureau of Animal Health; and to the Library. Tour of the Veterinary Laboratory, Weybridge.

Salmonella Pullorum Infection and Eradication: J. D. Blaxland, M.R.C.V.S., Poultry Department, Weybridge.

Salmonella Gallinarum and other Salmonellae Infections: J. D. Blaxland.

Respiratory Diseases of Poultry: H. P. Chu, PH.D., B.SC., Assistant Director of Research, School of Veterinary Medicine, University of Cambridge.
Hatchery Hygiene: J. D. Blaxland:

Duck Virus Hepatitis and other Diseases of Ducks: F. D. Asplin, M.R.C.V.S., DIP. BACT., Virology Department, Weybridge. *Deficiency Diseases, Nutritional and Metabolic Disorders*: J. D. Blaxland.

Coccidiosis and Blackhead: S. B. Kendall, PH.D., B.SC., M.R.C.V.S., and L. P. Joyner, PH.D., B.SC., Parasitology Department, Weybridge.

Avian Leucosis Complex: J. E. Wilson, B.SC., M.R.C.V.S., F.R.S.E., Veterinary Laboratory, Ministry of Agriculture, Lasswade, Edinburgh.

Fowl Pest (Newcastle Disease): N. Dobson, B.SC., M.R.C.V.S., F.R.S.E., Poultry Department, Weybridge. *Fowl Pest (Fowl Plague)*: N. Dobson.

Fowl Pox, Round Heart Disease, Pullet Disease: N. Dobson.

On the first morning, the members of the Course, representing Austria, France, Italy, the Netherlands, Norway, Portugal, Sweden and Switzerland, were received by the Director of the Veterinary Laboratory, Dr. A. W. Stableforth.

During the sessions each disease was dealt with as fully as possible by means of a lecture, demonstrations of specimens, techniques used in diagnosis, and finally a period devoted to discussion. The members responded excellently to the discussion portion on each disease.

Among visits made by the members of the Course were those to the National Laying Test, Milford, the School of Veterinary Medicine, University of Cambridge, where the party was shown around by Dr. H. P. Chu, in the unavoidable absence of Professor W. I. B. Beveridge, and to the Houghton Poultry Research Station, Huntingdon, where Dr. R. F. Gordon and his colleagues had arranged a series of demonstrations.

UNIVERSITY NEWS

Glasgow

A post-graduate clinical course will be held at the Veterinary Hospital of the University of Glasgow Veterinary School, from September 31st to October 4th, 1957 (inclusive). Further information may be obtained on application to the Secretary, Post-graduate Clinical Course, Veterinary Hospital, Bearsden Road, Bearsden, Glasgow.

HOLIDAY EXCHANGES

France

Widely-travelled 24-year-old student at Lyons Veterinary School, interested in tennis, ski-ing, sailing, music and drawing, would like to stay with English veterinary family, preferably in East Anglia, for one month in September, 1957, his family receiving an English student at their country home in Saone-et-Loire.

Seventeen-year-old French boy (Pacaudiere, Loire) would like to visit U.K. for a month during the summer holidays, with opportunity of visiting places of interest in the neighbourhood where he stays; the return visit would be spent at La Pacaudiere, where his family (which includes a brother of 15 and a sister of 8 years old) have a large house and garden, with meadow.

Germany

Seventeen-year-old German boy would like to arrange exchange visit with British child, himself visiting this country from August 1st to September 1st of this year. His father is a veterinary surgeon in Stadtsteinach, Oberfranken and his family includes two sisters (21 and 11 years old) and a brother of six years old.

Thirteen-year-old German boy, one of a family of three boys (15, 13 and 11 years old) would like to arrange exchange visit with British child, his own visit to England to be made between July 1st and August 15th of this year, and the return visit to be spent at the family's country house at Essenbüttel Krs. Gifhorn (Hanover).

PROVISION FOR LAMBING

A correspondent describes a Warwickshire farmer's provisions for lambing as follows: Mr. R. C. Longsdon has been devising means of securing better lambing results, and the outcome, now to be seen at Foxcote, Warwickshire, is a home-made square colony, with pens on three sides and a fenced enclosure, all constructed from materials on a normal farm.

Here, in warmth and comfort, with electric light laid on for night attention about 200 ewes will have their lambs and spend a day within range of the farmer or shepherd.

The walls and roof of the sheep settlement are made of straw lined with wire-netting, and stout posts cut from nearby woodland give the necessary support to the structure.

There is quick and easy access from the farmhouse and buildings. " We don't have to go chasing round the fields with torches at night to find the lambing ewes " Mr. Longsdon has said. " We bring the sheep into the enclosure just before lambing and then into the shelter of the pens. They spend a day there with their lambs and are then moved into the fields.

" We are getting excellent results without troublesome toil or a lot of time spent searching for sheep. In time of severe weather, it is easy to lose lambs if one cannot get to them within 24 hours. It was for that reason I decided it was time for rough and ready methods to be discarded."

R.V.C. STUDENTS' UNION BALL

Readers will have noticed, under Coming Events, the announcement of the 165th Annual Ball of the Royal Veterinary College Students' Union Society which is to take place at the College on May 24th.

The programme sounds an ambitious and attractive one, and the Ball will last from 9 p.m. until 4 a.m. A buffet supper will be served, and during the course of the festivities there will be a number of novelties and original features. Tickets (double) are priced at 3 guineas each and a cordial invitation is extended by the Union's entertainments committee to the whole profession.

MR. HAROLD DYSON

We record with regret the death of Mr. Harold Dyson, of Huddersfield, at the age of 80. He had been in failing health for some time. He qualified in 1899, and later joined the Royal Army Veterinary Corps, being promoted to the rank of Captain. In Huddersfield he was in partnership, to the time of his retirement, with the late Mr. S. Chambers.

Mr. Dyson had been a keen golfer, and was a member of the Longley Park club.

PERSONAL

Birth

JAMES.—To Joan, wife of Terence Morton James, on Sunday, April 14th, at Newtown Hospital, Montgomeryshire—a son, Garry Stephen, brother to Nigel.

Many members of the profession who met him at exhibitions and elsewhere will learn with regret of the death of Mr. A. C. Attree, of Messrs. Baillière, Tindall & Cox. He was a familiar figure on the publisher's stand, and was much esteemed by all those with whom he had dealings.

COMING EVENTS

May

8th (Wed.). UFAW Symposium on "Human Technique in the Laboratory" in the Harkness Hall, Birkbeck College, Malet Street, London, W.C.1, 9.45 a.m.

Fifteenth Annual General Meeting of the Society of Women Veterinary Surgeons at Glaxo Laboratories, Ltd., Greenford, Middlesex, 11.30 a.m.

9th (Thurs.). Annual General Meeting of the Essex Veterinary Society at the Essex Institute of Agriculture, Writtle, Nr. Chelmsford, 7.30 p.m.

15th (Wed.). Annual General Meeting of the A.V.T. & R.W.s Scottish Regional Group at the Hannah Dairy Research Institute, 10.50 a.m.

Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 5 p.m.

Spring Meeting of the Eastern Counties Veterinary Society at the Field Station of the Equine Research Station, Lanwades Park, Kennett, Nr. Newmarket, 6.30 p.m.

17th (Fri.). Meeting of the R.A.V.C. Division at the National Institute for Research in Dairying, Shinfield, Reading, 11 a.m.

18th (Sat.). Annual Dinner of the R.V.C. '52 Club at Ye Miller of Mansfield, Goring.

24th (Fri.). 165th Annual Ball of the Royal Veterinary College Students' Union Society at the Royal Veterinary College, Camden Town, N.W.1, 9 p.m.

June

5th (Wed.). Royal Veterinary College Association annual dinner at R.V.C., 6.30 for 7 p.m.

12th (Wed.). Annual General Meeting of the Midland Counties Veterinary Association at the Birmingham Medical Institute.

13th (Thurs.). Annual Dinner of the R.A.V.C. Officers' Club at the Grosvenor House, Park Lane, London, W.1.

July

10th, 11th and 12th, Wednesday, Thursday and Friday. Meetings of Council and Committees of the B.V.A. in London.

August

25th-31st. 75th Annual General Meeting and Congress of the B.V.A. at Cambridge.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Denbigh. Hendre Fawr Farm, Abergele (Apr. 24).

Hants. Bassett Farm, Bishops Sutton, Alresford (Apr. 23).

Norfolk. Rookery Farm, Hellington (Apr. 23); Ivy Farm, Thwaite St. Mary, Bungay (Apr. 24).

Staffs. Sutton House Farm, Sutton, Newport (Apr. 20).

Wigtown. West Cairngaan, Drummore, Stranraer (Apr. 23).

Fowl Pest

Kent. Tearnden Farm, Bethersden, Ashford (Apr. 23).

Lancs. 1, Church Road, Tarleton; 9, Brookfield Avenue, Marton; 150, Midgeland Road, Marton, Blackpool; Whittles Farm, 78, Church Road, Tarleton; 52, Church Road, Tarleton (Apr. 25).

Swine Fever

Bucks. Fremar, Denham Lane, Chalfont St. Peter (Apr. 23).

Carmarthen. Pantyrathro, Llangain, Llanstephan (Apr. 23).

Denbigh. Borras Head Farm, Borras, Wrexham (Apr. 24).

Dorset. Heather View, Cripplestyle Alderholt, Fordingbridge (Apr. 23).

Hants. Pigeon House Farm, Purbrook, Portsmouth (Apr. 25).

Kent. 128, Bredhurst Road, Wigmore, Gillingham (Apr. 23); Warren Farm, Boughton Aluph, Ashford (Apr. 26).

Lancs. Garside Farm, Sunnyside Lane, Droylsden (Apr. 29).

Leics. Sludge Hall Farm, Cold Newton, Tilton on the Hill (Apr. 29).

Middx. 6, Field Road, Denham, Uxbridge; 10, Smallholding, Clockhouse Lane, Ashford (Apr. 24); Pylon Farm, New Years Green Lane, Harefield (Apr. 29).

Norfolk. Woodthorpe Farm, Winfarthing (Apr. 23).

Northampton. Manor Farm, Pattishall, Towcester; School Hill, Helmdon, Brackley (Apr. 24).

Staffs. Nethersett Hey Farm, Madeley, Crewe (Apr. 29).

Surrey. Park Farm, Cobbetts Hill, Normandy (Apr. 29).

Yorks. Field Head Farm, Shepley, Huddersfield (Apr. 26); Delph Slack Farm, Delph, Oldham (Apr. 29).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Anaesthetic Face-masks

Sir,—I enclose a photograph which illustrates two prototype face-masks designed for inhalation anaesthesia of the dog and cat, although they have also proved to be satisfactory for calves, sheep, goats, and pigs. They are manufactured in rubber latex and I have found them to have the following characteristics:—

They are malleable, and therefore can be shaped to ensure a comfortable and close fitting with the face of the animal. They are light-weight, strong and can withstand very rough treatment. They are easily cleaned by washing in hot soapy water, and after use on an animal which may be suffering from an infectious disease, they may be sterilised by immersion in a solution of disinfectant.

Their design is such that "dead space" is reduced to a minimum, and in the case of the smaller mask a Heidbrink expiratory valve is mounted directly on the face-piece. The wide-bore connexion to the anaesthetic apparatus results in minimal resistance to respiration. The masks are obtainable from the British Oxygen Company Limited.

Yours faithfully,

L. W. HALL

Department of Veterinary Clinical Studies,
School of Veterinary Medicine,
University of Cambridge.

April 24th, 1957.

Treatment of Wounds

Sir,—I was interested in the recent article on the use of Dequadin wound powder by Bruce V. Jones and N. Fowler.

I have had the most dramatic results using this powder on contaminated wounds of various sorts. In particular, the following may be mentioned:—

Guanaco: multiple abscesses and suppuration on both hocks; American Marten: severe lacerations and multiple fractures of front leg with violent secondary sepsis. I made use of Trueta's technique plus Dequadin. Llama: compound fracture of the foreleg with heavily contaminated wound. The wound was filled with Dequadin and the leg put under plaster. There was no evidence of sepsis. Spot-nosed Monkey: compound fracture of the tail with protruding bone. Closed dressing with Dequadin. Donkey: septic rubbing sores around the mouth. Rapid recovery with Dequadin.

Yours faithfully,

OLIVER G. JONES,
Curator of Mammals and Veterinary Officer.

Zoological Society of London,
Regent's Park,
London, N.W.1.

April 24th, 1957.

Bovine Obstetrics

Sir,—Mr. Straiton in his article (*Vet. Rec.* **69.** 395) makes reference to the condition ring womb in ewes, and states that, in his opinion, based on observation on 28 cases, the condition is non-existent. I am afraid I do not agree with him. I have been interested in the condition as it occurs in this part of the country for several years, and have formed certain opinions.

The clinical picture here is as follows: The ewe is noticed in labour, but after a lapse of two to three hours nothing appears except a small string of afterbirth. When examined, the *os uteri* is found to be dilated only sufficiently to admit two fingers. The ewe carries on grazing with an occasional attempt at lambing which she soon gives up, but no further dilatation occurs. If left, she dies of toxaemia in a few days.

The violent straining seen in a ewe with a prolapsed vagina with a completely closed *os* should not be confused with ring womb. In such cases, the cervix will open when actual parturition commences. The violent straining is due to pressure of the prolapsed organ on the urethral orifice causing distension of the bladder.

Between the years 1947 and 1954 I adopted the "watching and waiting" practice and stilboestrol therapy with unfortunate results. In March, 1954, I resorted to caesarean section. To date I have operated on more than 20 cases with a reasonable degree of success and I know which method my clients prefer. I agree with Mr. R. T. Pepper that the longer the delay in operating, the less chance

there is of the lambs surviving. I think that if the operation is performed within 18 hours there is a good chance of live lambs. After 24 to 48 hours' delay the lambs are usually dead, or, if delivered alive, do not survive, but the mother still stands a good chance. After 48 hours' delay, the ewe's hope of survival is not good, although I have operated on one successfully after 72 hours.

I am interested in Mr. W. S. Johnston's results with dienoestrol (Dinovex). I have used it this season on one case of ring womb. At 10 a.m. one morning I admitted a ewe which had commenced lambing at 7 p.m. the previous evening; I injected 5 ml. Dinovex plus penicillin. There was no response at 10 p.m., but in order to give the injection a fair chance, I decided to postpone operating until the morning. Alas, next morning the ewe was dead with a very distended abdomen and an offensive vaginal discharge. My client was not very impressed, as he had understood, when he brought the ewe in, that I was going to operate, as in a similar case the previous year.

I would like to hear other members' experience with this drug. I think the ring womb ewe is a challenge to the veterinary pharmacologist and physiologist. The fact that ewes which have been operated on will lamb normally next season would suggest that the condition is due to temporary hormonal imbalance.

Yours faithfully,
W. MacKINNON.

8, The Square,
Beaminster,
Dorset.

April 23rd, 1957.

Sir,—The case of Straiton and others, versus Walsby has created much discussion in the profession. In that respect it has served a useful purpose. Our view is that many of the hints given by Mr. Straiton are very valuable and often employed in this practice. But by no means are we able to resort to the method of just waiting, every time we get a calving case.

Fortunately, we have had no heifers or cows die as a result of obstetric interference; death has been due, when it has occurred, usually to the diseases mentioned by Mr. Walsby.

Our chief problems about waiting too long are:—

We have not got three or four assistants who can be sent to examine an animal every few hours. Pressure of work prevents us from doing this ourselves.

There are, as yet, no midwives available to us as is the case in human obstetrics.

There are *some* farmers who cannot successfully be educated to such a point of view as Mr. Straiton's. The inevitable answer being—"I sent for you to calve my animal, if you won't then I know someone else who will!"

There are good Friesian herds in Gloucestershire. The farmers here always give their heifers "plenty of time," whether because of their own common sense or from fear of veterinary surgeons' fees we do not know, but in general they keep their tractors for ploughing! However, we have noted Mr. Straiton's observations on the large foetus and will put into practice some of his precepts this autumn.

We find that at times caesarean section (or embryotomy) is indicated, and we would say that some large calves just cannot be born no matter what power in the world is at work. The head and shoulders are too large to pass the maternal pelvis. We need not recount the pathological conditions of calves that make surgical procedure necessary. We would also point out the value of calcium, intravenously, in older cows when progress is slow or altogether absent.

We wish to congratulate Mr. Straiton on watching the complicated process of birth in a herd of his own, thereby letting the bovine animal complete our knowledge of natural birth through his observation. Far too little stress is laid on normality and observation in our university training, and rather too much on quick interference.

Lastly we agree with Mr. Walsby, with regard to the presentation of this paper. Such remarks as "ripped passages," "tearing the neck" and "ruptured wombs" are out of place in a professional article. Expressions of opinion and experiences of this nature are best placed in the correspondence column. If one has a number of good ideas and wishes to pass them on they should be presented appropriately since THE RECORD is read by other professional bodies. "Jargon" gives a wrong impression, and the writer is simply asking for such criticism as that of Mr. Walsby.

Yours faithfully,
MICHAEL GLAS,
ROSS GRAHAM,

13, Barton Street,
Tewkesbury,
Glos.

April 24th, 1957.

The Use of Glycyrrhetinic Acid

Sir,—The article by O. F. Jackson and Elizabeth K. M. Jackson in your last issue on some uses of glycyrrhetinic acid brings to your columns a subject which has been the cause of much controversy recently in the medical press, and the issue appears to have been confused by the fact that some preparations of this drug do not appear to have contained its active fractions. Estimation of the results obtained with material of this nature used externally must largely depend on clinical observation, and it is reasonable to assume that, in human medicine, the psychosomatic factor must have considerable bearing on the clinician's estimate. Fortunately, in veterinary practice, this factor would appear to have only a very small effect, but it is as well to remember that it has been amply borne out that clinicians' estimates of different drugs do vary considerably not only between individuals but also in different parts of the country.

I have had the opportunity of carrying out fairly considerable trials with the active isomers of glycyrrhetinic acid in a variety of forms of the same manu-

facture as that used by Mr. & Mrs. Jackson, and would make it clear at the outset that I have not compared this material with cortisone since I have never used the latter drug mainly on account of cost. I would agree that glycyrrhetinic acid has a very definite anti-inflammatory action and is of considerable value in treating cases of non-specific dermatitis especially when it is combined with an antibiotic, the one which has been used is neomycin. I have had excellent results in cases of keratitis in all species especially those cases following trauma either actual or as the result of an infection, such as is seen in cattle; in many cases the rapidity of healing and complete resolution have been remarkable,

In contrast with Mr. & Mrs. Jackson my results in canine otitis externa have been disappointing, but it should be noted that the trial was a severe one on cases which had proved resistant to other treatment. Poor results were obtained also when using the material in combination with neomycin and bacitracin as an intramammary cream for bovine mastitis; it may be that, in the latter case, the concentration of active agents has not been sufficiently high and further trials are anticipated. As a pessary, again combined with neomycin and bacitracin the drug has been of great value in treating cases of bovine metritis, mainly those due to retention of the placenta. Considerable trials have been carried out in this condition and I estimate that the use of glycyrrhetinic acid has reduced the average number of visits necessary in these cases by at least one. As might be expected glycyrrhetinic acid has proved valuable in controlling the skin lesions found in "sweet itch" in ponies but naturally it will not prevent the condition.

As has been indicated glycyrrhetinic acid would seem to have a place in a wide field of veterinary therapeutics, but it is obvious that much further trial is needed. It would seem that such trial can only be based on clinical estimation in many cases. This should not cause insuperable difficulties, however, on account of the cheapness of the drug compared with others having the same action.

Yours faithfully,

H. F. HEBELER,

North Street,
Langport,
Somerset.

April 28th, 1957.

Correcting the Displaced Bovine Abomasum

Sir,—The method of correcting the displaced bovine abomasum reported by Mr. Jennings in THE RECORD of April 13th would seem to be based on the argument that " The greatest hindrance to the complete transfer of the abomasum from the left to the right side of the rumen is the presence of the superficial greater omentum. . . . If, however, the omentum is torn from the longitudinal groove of the rumen, then the abomasum can be pushed under the rumen readily . . . "

May I suggest that is it, in fact, acquired adhesions between the omentum and the rumen which make reposition difficult?

In 1955 a cine film taken of the surgical correction of this condition shows clearly such adhesions and the way in which they complicate replacement of the abomasum. A case operated on recently illustrates that interference within the abdomen should be restrained to the minimum. A cow which had sustained a displaced abomasum some six weeks prior to being presented for treatment was operated on by means of a single left flank incision. The abomasum, when returned to its normal position, persisted in displacing itself because of the lack of volume of the rumen. Attempts to overcome this by pulling the abomasum up over the dorsal surface of the rumen were not successful.

The rumen was incised and filled with a mixture of two buckets full of sugar beet pulp and one of bran. This prevented the abomasum from again being displaced and the cow appeared to be making an uneventful recovery. On the 27th day she was found down and was slaughtered. *Post-mortem* examination revealed the laparotomy and rumenal incisions healed by first intention, and a colossal hydro-nephrosis of the left kidney caused by damage to the left ureter, presumably in the course of the operation or by subsequent adhesions.

When contemplating such a procedure as that advocated by Mr. Jennings it may be wise to remember that the peritoneal cavity and its contents have tremendous adhesive powers, whilst at the same time their ability to function depends upon their freedom from adhesions and subsequent obstruction or constriction.

It is my view that, as in all surgery, great restraint should be exercised especially when dealing with normal structures, and that in this particular condition, location and detachment of the acquired adhesions will usually result in satisfactory reposition of the displaced organ.

Yours faithfully,

P. J. DALTON.

Old Sarum House,
Stratford Road,
Salisbury.

April 27th, 1957.

ADVERTISERS' ANNOUNCEMENTS

THE ARMOUR LABORATORIES, Hampden Park, Eastbourne, are pleased to announce the appointment of Messrs. W. Gimber & Sons Ltd., Peckham, London, S.E.15, as sole distributors in the United Kingdom for their range of veterinary medicines including P.O.P. (Purified Oxytocic Principle), Fantomar, Adrenomone (A.C.T.H.), and Tryptar.

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